MEDTALK
HOW AIR POLLUTION CAUSES DEPRESSION

COVID-19
mRNA VACCINES AND CANCER

MENTAL HEALTH
THE DISORDER BEHIND BURARI DEATHS

THE WEEK
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DECEMBER 5, 2021

health

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PLUS

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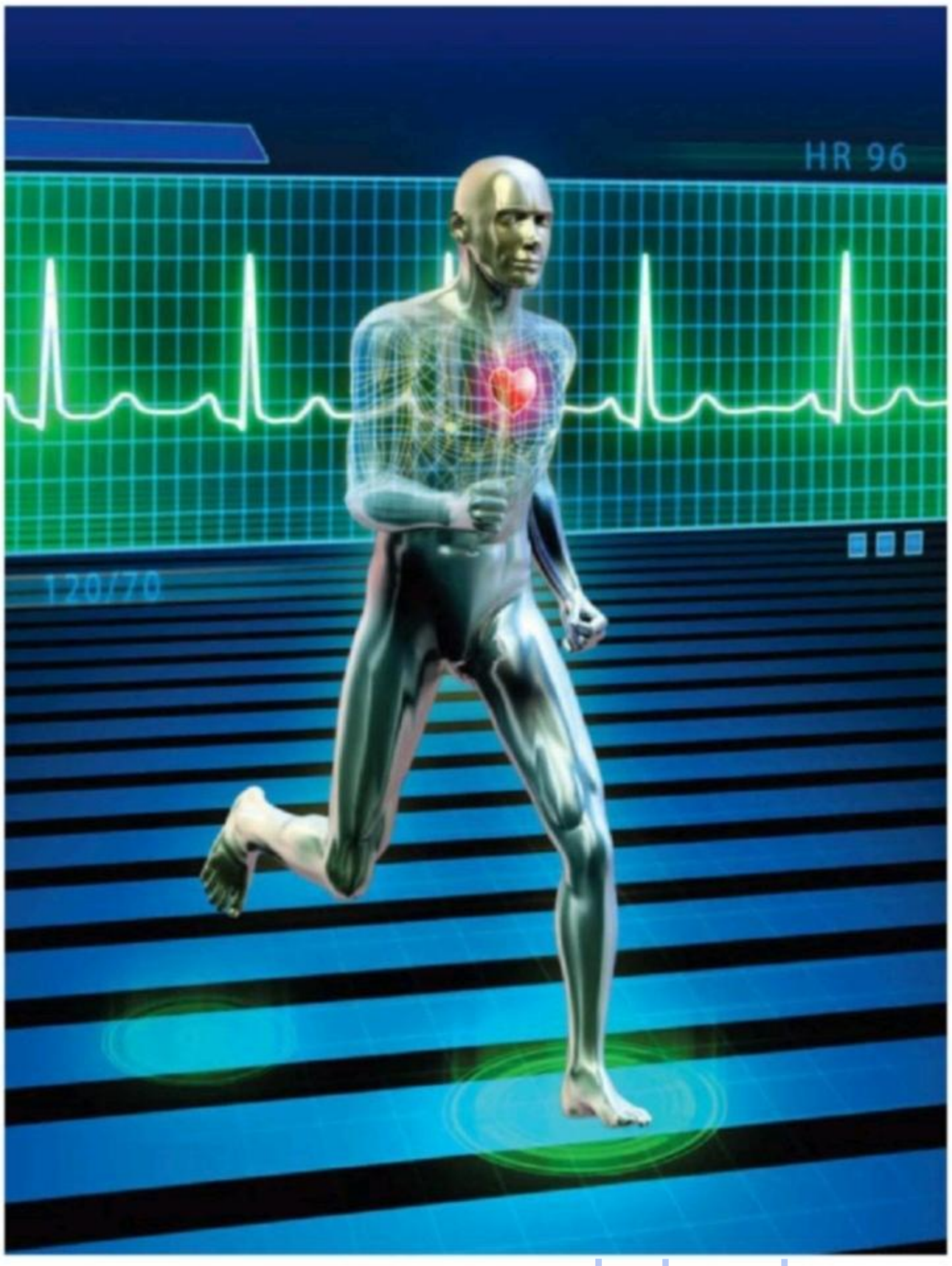

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DON'T DIE TRYING

While exercise in itself cannot be blamed for tragic outcomes like cardiac arrests, experts agree that pushing your body to extreme levels can be harmful to health

Plus

Packed schedules are putting athletes at risk

Heed warning signs: Dr Aashish Contractor, Reliance Foundation Hospital, Mumbai

Our biological fitness: Dr Rajeshwari Janakiraman, Manipal Hospitals, Bengaluru

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LETTERS

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The joys of endurance

Dr Dinesh Arab's experience travelling to Mount Kilimanjaro made for an excellent read ('A high like no other', November 7). There is so much information about Mt Kilimanjaro and surrounding areas in his essay. Climbing the highest free-standing mountain is not that easy, and Dr Arab seems to have enjoyed it thoroughly.

Cardiovascular endurance is important for proper functioning of the heart and we should learn to use oxygen more productively while working hard, by taking frequent breaks between rigorous physical activities.

VYOM PRAKASH,
On email.

Arab's trip to Kilimanjaro should inspire other doctors to take similar challenges. It is important for doctors to have a satisfying life, and travel widely. Travel expands our knowledge and we get to meet so many people from different backgrounds. Doctors had to face so many problems during the pandemic. Now they should enjoy and go on a travel break like Dr Arab.

TIGIN THOMAS,
On email.

Endurance is the mantra to a successful life. Without difficulties and challenges life has no meaning. You will become stronger, compassionate and grateful when you put up with difficulties. Muscular endurance helps one achieve fitness goals quickly. We should not be satisfied with what we are doing. We should always strive to achieve more.

I have read articles on how the brain limits physical activities. If so, experts say the onus is on us to train the brain to force the body beyond limits. It is important to take any exercise as play and recreation. Never take them as a burden. It is a natural therapy.

PRATAP CHANDRAN,
On email.

Timely article

I am grateful to Anjuly Mathai for her timely article on how mothers are expressing worry about the long-term impact of the pandemic on their children ('A lost childhood?', November 7). These are difficult times for parenting as we are struggling to come out of the impact of the pandemic on our economy. There is a good possibility that children may not receive sufficient attention during this period.

The article will help parents have a better understanding of children's behaviour, and will also enable them to find creative ways to avert or reduce possible psychological issues that children may face in future.

RINS PADAMATTUMMAL,
On email.

During the peak of the pandemic many stress-sensitive mothers have had to go through hell. Every parent today is anxious, and concerned about their child's social skills. Children are bound to be affected in the long run because of anxiety-related issues. A stress-free environment is absolutely necessary for effective parenting. Parents should spend more time with their

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children and take them out more often, taking all precautions of course.
SURAJ KUMAR,
On email.

This story has highlighted the role of parenting during the pandemic very well. It is useful as these days children are quite depressed with all kinds of restrictions on their movements.
SAUL ABHISHEK,
On email.

Kids are interacting less during the pandemic and that's a challenge. Many of them will go on to become shy. Some young kids are taking time to speak properly, which is worrying.

I hope things improve and we are back to where we were before the onset of the pandemic.
TAPESH NAGPAL,
On email.

Useful book

Kalki Koechlin's book will be useful for many; she is one of the few sensible actors we have ('Fighting the baby blues', November 7). I am eager to grab a copy of Koechlin's book. So many mothers, like Koechlin, gave birth to children during the pandemic. Hats off to them.
TANUSHRI NAGORI,
On email.

Less screen time

It is true that spending too much time on smart devices can impair our eyes and vision ('Quickscan', November 7). Less screen time means a better body and mind. It is shocking to know that if this is how it goes half the population will have myopia by 2050.

Some say blue light glasses can protect one's eyes while in front of a laptop, but there is no strong evidence to prove it.
SURAJ TYAGI,
On email.

Good section

The 'Do you know' section in Quickscan caught my eye at once. It is useful and enlightening. I look forward to such useful health tips and information in the forthcoming issues.
M. VINESHRAGUL,
On email.

Bundle of information

Every issue of the Health magazine comes up with a variety of insights about the human body, mind and other facets of human life. It is so good in spreading knowledge and awareness on the need to have good health.
SOHAN FERNANDES,
On email.

WRITE TO US!
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BABY STEPS

Basics of baby wearing

Lakshmy Ramanathan

टाइगर

EVEN A DECADE AGO, baby wearing in most Indian cities was a rare sight. Neither had parents warmed up to the concept, nor were there too many options for baby wearing in the maternity and infant stores that were cropping up. Today though, there are a multitude of options. These range from wraps that help you and your baby snuggle up for a snooze on a rocking chair to carriers that attach to a backpack to take your baby with you when you go cross-country hiking! Even so, not many Indian parents invest in a baby carrier, though many of our tribal and rural communities have carried babies in a sling or wrap as they go about their work in the wild or fields. Perhaps the reluctance is to do with affordability and doubts over its necessity and harmful effects on the baby's spine.

Studies over the past few decades reveal that baby wearing in all its forms is completely safe. Investing in a good quality baby wearing option that meets with international safety standards helps a mother/couple have a life beyond parenting, allowing them to carry out activities such as trekking or just plain window-shopping.

Studies in the recent times have also shown that baby wearing for three to four hours a day

- Reduces crying and facilitates sleep in an overly stimulated or cranky infant
- Facilitates better bonding between mother and child owing to the close contact
- Improves growth rate. Close contact with a mother's touch, warmth, breathing patterns and heart beat have been shown to make a positive difference especially to pre-term babies.
- Helps the hip joint and spine develop in the correct direction

Lakshmy Ramanathan is the author of *For Bumpier Times: An Indian Mother's Guide to 101 Pregnancy & Childcare Practices.*
This is the fourth part of the series and deals with queries and quirks surrounding infant care.

Five distinct versions include wraps, ring slings, pouch slings, *mei tais* and buckle carriers. Do make sure that the style you choose allows the baby to adopt an M position—the arms of the letter M indicate the legs; the top part of the letter's arms indicate the knee caps; the slanting lines indicate where the thigh line should rest; and the crook of M indicate where the bottom of the baby will sit.

A good way to close in on a style is by deciding till what age you will want to carry your baby, and what is the general range of your activities over weekdays and weekends.

Next issue: Putting baby to bed

Share Your Story

Send your parenting stories in fewer than 150 words along with a photograph at ramanathan.lakshmy@gmail.com

When my son was weaned off breastmilk, we started supplementing his diet with baby food. He, however, started passing loose stools and went on to develop rashes. Initially, we thought the rashes were caused by the bathing soap. Then, we suspected the water. Later, we thought it was because he was putting things in his mouth. I was at my wits' end as he was losing weight rapidly. We tried a process of elimination and observed that as soon as he drank milk, he purged. Doctors diagnosed him as lactose intolerant and advised us to give him a lactose-free diet. But my mother didn't like the idea of an infant skipping milk. So, she started diluting milk with equal portion of water to feed him. He stopped purging, his health improved and to this day, he doesn't hit the bed without a glass of milk!

G. VENKATAKUPPUSWAMY
BENGALURU

Fight Cancer With Herbs

Cancer, an abnormal growth of cells in any tissue or organ of the body is one of the commonest causes of death. The incidence of cancer has been rising alarmingly since the last couple of decades because we are constantly exposed to cancer causing agents, better known as carcinogens, in the food we eat, in the water we drink and in the air we breathe. Our single meal might be containing a dozen carcinogens in the form of residues of pesticides and insecticides. Moreover, life has become fast and competitive, from cradle to grave, generating a lot of stress that further enhances the risk of cancer by suppressing the immune system of the body.

Normal cell division in our body is a highly regulated mechanism, controlled by genes (segments of DNA). A prolonged exposure to carcinogens damages the DNA and induces mutations in growth regulatory genes and pathways, which in turn may induce activation of oncogenes (ras, N-myc, c-myc, HER-2/neu), inactivation of tumour suppressor genes (p53, Rb, Ret, WT-1, APC, etc) and dysregulation of pathways (ras, Rb, myc, etc). The mutated cells may go haywire, proliferate indiscriminately, usually forming a mass called neoplasm, malignant tumour or Cancer.

As the time passes and cancer grows in size, the cancer cells go on accumulating further mutations and acquire more evil characteristics such as ability to create own blood vessels (tumour-angiogenesis) for nutrition, ability to invade and move into the adjoining tissues, travel through lymph and blood vessels, lodge in distant organs of the body to form new colonies (metastases), evade the process of programmed cell death (apoptosis) and acquire the ability of limitless replication, making cancer cells immortal.

The transformation of a normal cell to a cancerous cell is probably not such a critical event in the genesis of cancer rather it is inability of the body's immune system to identify and destroy the newly formed cancer cells, when these are few in numbers. Although every living cell in the human body has the potential to convert into a cancerous cell, the malignant transformation is considered as the rarest of rare events. This has been observed that the risk of cancer is multiplied in those persons, whose immune system is suppressed due to any factor including chronic stress, old age, chronic debilitating diseases, viral infections (such as HIV, HPV, HBV, HCV) and abuse of drugs such as analgesics, antibiotics and corticosteroids.

टाइगर

Sino Vedic Cancer Research Centre was founded in 1985 by Dr. S.P. Kaushal, M.B.B.S., M.D. (Chinese Medicine), D.Sc. (Honoris Causa), along with a team of doctors and scientists with the aim to explore the role of herbs in cancer treatment. As cancer cells are cells of our own body (which have gone haywire) so the fight against cancer was focused on normalising the cancer cells by reversing mutations and boosting the immune system of the body.

Over a period of time, Sino Vedic Cancer Research Centre identified more than 450 anticancer herbs having DNA repairing, antimutagenic, radioprotective, chemoprotective, anti-tumour-angiogenic, proapoptotic & immunoenhancing properties and thereafter isolated concentrated extracts containing required phytoconstituents from selected anticancer herbs to develop Oncotame Ayurvedic Formulation that helps to fight cancer without side effects.

Oncotame Ayurvedic Formulation helps to fight cancer at every step, that is, genesis, growth and spread of cancer without side effects.

Oncotame Ayurvedic Formulation tames cancer cells by repairing damaged DNA thus reversing mutations, inhibiting tumourangiogenesis and reviving the process of apoptosis that helps to convert cancer cells into normal cells.

Oncotame Ayurvedic Formulation helps to boost the immune system of the body by stimulating the production and activity of the Natural Killer cells, T-lymphocytes, Lymphokine Activated Killer cells and macrophages. Oncotame Ayurvedic Formulation promotes production of cytokines including interleukins, interferons, tumour necrosis factors and colony stimulating factors.

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Oncotame Ayurvedic Formulation can be taken along with chemotherapy, hormone therapy, immunotherapy, radiotherapy or any other treatment before or after the surgery. For more information kindly visit our website or contact:

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QUICK SCAN

टाइगर

HEALTH

TIMING OF EXERCISE MATTERS

IT IS ALREADY known that people with type 2 diabetes should exercise regularly. Now a US study published in the journal *Diabetes Care* suggests that timing of the exercise is also important for better fitness levels and cardiovascular health.

According to the study morning workouts can increase the risk of a heart attack in men with type 2 diabetes.

The study was based on 2,035 obese or overweight people with type 2 diabetes.

The participants wore accelerometer devices on their waists that measured the time and type of their physical activity, for a week. Men who performed moderate-to-vigorous exercise in the morning had the highest risks of developing coronary heart disease irrespective of the amount and intensity of weekly physical activity and cardiorespiratory fitness.

Men who were most active midday had lower cardiorespiratory fitness levels.

However, there was no association between specific activity timing and coronary heart disease risk or cardiorespiratory fitness in women.

DID YOU KNOW?

According to a survey of 2,004 Americans, men cry on average about four times a month compared to three times a month for women. That is 48 times a year for men and only 36 for women.

Vida Health

QUICK SCAN

HPV VACCINE CUTS CERVICAL CANCER

THE HUMAN PAPILLOMAVIRUS (HPV) vaccine reduces cervical cancer by 87 per cent, confirms a British study published in the journal *The Lancet*.

Cervical cancer is the fourth most common cancer in women in the world, accounting for more than 3,00,000 deaths each year.

Nearly all cervical cancers are caused by HPV. The virus is also linked to other cancers including vaginal, vulval, anal, penile and some head and neck cancers. The vaccine is most effective when offered between the ages of 11 and 13, before girls become sexually active and are likely to get exposed to the virus.

The findings are based on an analysis of all cervical cancers diagnosed in England in women aged 20-64 between January 2006 and June 2019. The HPV vaccination programme started in England in 2008.

The risk of cervical cancer was 87 per cent lower among women who received the vaccine at ages 12 or 13, compared to unvaccinated women. It was 62 per cent lower in those who got the vaccine at ages 14-16 and 34 per cent lower in women who received the vaccine at ages 16-18.

Overall, the vaccination programme prevented about 450 cervical cancers and 17,200 pre-cancers during the nearly 13-year study period.

EARLY-ONSET HYPERTENSION LINKED TO INCREASED DEMENTIA RISK

PEOPLE WHO ARE diagnosed with high blood pressure at an early age have smaller brain sizes and are more likely to develop dementia, according to new research published in the journal *Hypertension*.

The researchers analysed data from 2,70,904 participants in the UK Biobank. They compared the development of dementia in 1,24,053 people with high blood pressure and 1,24,053 matched adults who did not have high blood pressure.

During up to 14 years of follow up, 4,626 people developed some form of dementia. People diagnosed with high blood pressure between the ages of 35 and 44 had a 61 per cent increased risk of dementia compared to those who did not have high blood pressure.

The risk of vascular dementia was 45 per cent higher in the adults diagnosed with hypertension between ages 45-54, 69 per cent higher in those diagnosed between ages 35-44 and 80 per cent higher in those diagnosed

before age 35 compared to those of the same age without high blood pressure.

However, no relationship was found between the age at hypertension diagnosis and the risk of Alzheimer's disease.

To analyse related brain changes, they compared MRI measurements of brain volume between 11,399 people with high blood pressure and 11,399 participants who did not have high blood pressure.

In all age groups, the total brain volume, as well as the brain volume of several regions, were smaller in people diagnosed with high blood pressure compared to those who did not have high blood pressure. Those diagnosed before age 35 had the largest reductions in brain volume.

DID YOU KNOW?

Regularly engaging in nature-based activities can improve mood and positive emotions and decrease anxiety, even in people with pre-existing mental health problems.

SSM–Population Health

RADIATION THERAPY RISKS REVEALED

WOMEN WHO RECEIVE radiation for breast cancer in their left breast have more than twice the risk of developing coronary artery disease compared to those who had radiation in their right breast.

The findings of the study published in the *Journal of the American College of Cardiology: CardioOncology* included 972 women, aged 55 years or younger, who received radiation for stage 1 or stage 2 breast cancer. All the women were free of cardiovascular diseases at the start of the study.

Overall, 10.5 per cent of the women who received left-sided radiation developed coronary artery disease compared with 5.8 per cent of women who received right-sided radiation, during 27 years of follow up.

Among women who were younger than 40, 5.9 per cent of those who received left-sided radiation developed heart disease, while there was no incidence of heart disease among those who received right-sided radiation therapy.

Among women aged 40-54 years, 18.7 per cent developed coronary artery disease after left-sided radiation therapy compared to 6.8 per cent after right-sided radiation therapy.

The incidence of heart disease among women given right-sided radiation was similar to those seen in women in general. When providing follow up care for breast cancer survivors, doctors should consider the laterality or side of their cancer.

QUICK SCAN

FIND YOUR SLEEP 'SWEET SPOT'

FINDING YOUR SLEEP 'sweet spot' is crucial to stay mentally sharp and to keep cognitive performance stable as you age.

According to a US study published in the journal *Brain*, both short and long sleepers experience greater cognitive decline. Getting the right amount of sleep can reduce the risk of mental decline, even if you have early Alzheimer's disease.

Both poor sleep and Alzheimer's disease are associated with cognitive decline and poor sleep can hasten the progression of Alzheimer's disease.

This study included 100 older adults whose average age was 75. The participants underwent a sleep study and were tested for early signs of Alzheimer's disease.

Their cognitive function was assessed for an average of 4.5 years. Most of the participants (88) had no cognitive impairment, 11 had very mild impairment and one had mild impairment.

Overall, cognitive scores declined for those with less than 5.5 or more than 7.5 hours of self-reported sleep per night, even for those with early signs of Alzheimer's disease.

But cognitive function stayed stable for those within a middle range of sleep time.

DID YOU KNOW?

Increasing intake of food rich in calcium and protein like milk, cheese and yoghurt can reduce the risk of fractures of any kind by 33 per cent, hip fractures by 46 per cent and fall by 11 per cent in older adults.

The BMJ

FEED EGGS EARLY TO CHILDREN

CHILDREN WHO ARE fed eggs before 12 months are less likely to develop egg allergies in the future.

The findings of the study presented at a meeting of the American College of Allergy, Asthma and Immunology (ACAAI) was based on an analysis of data from 2,237 parents who were surveyed about their children's eating habits and food allergies from birth to 6 years of age.

Among them, 0.6 per cent reported egg allergy in their children at one year, and 0.8 per cent reported egg allergy at 6 years.

Children who had not eaten eggs by 12 months and those who were fed fewer eggs at 5, 6, 7 and 10 months of age were much more likely to develop food allergies by age six, compared to those without food allergies.

Egg allergy is the second most common food allergy in the world. Early introduction of eggs during infancy, followed by consistent and frequent feedings, is protective against the development of egg allergy, the study author said.

QUICK SCAN

NEW GUIDELINES FOR CARDIOVASCULAR HEALTH

NEW DIETARY GUIDELINES issued by the American Heart Association focuses on overall dietary patterns, rather than specific foods or nutrients. It encourages people to start healthy eating at an early age and to maintain a healthy diet throughout life.

Poor diet is strongly associated with an increased risk of cardiovascular disease and death.

The 10 dietary steps for a healthy heart include

(1) Balance calorie intake with physical activity to achieve and maintain a healthy body weight

(2) Eat plenty and a variety of fruits and vegetables

(3) Choose whole-grain foods over refined grain products

(4) Choose healthy sources of protein (mostly from plants like legumes and nuts); fish and seafood; low-fat or fat-free dairy products; and lean cuts of meat and avoid processed meat

(5) Choose healthy oils such as olive oil and sunflower oil, and avoid tropical oils such as palm oil and partially hydrogenated fats

(6) Choose minimally-processed foods instead of ultra-processed foods

(7) Limit the intake of beverages and foods with added sugars

(8) Choose and prepare foods with little or no salt

(9) Limit alcohol intake and if you do not drink alcohol, do not start

(10) Follow this guidance regardless of where food is prepared or consumed.

BEST TIME FOR REHABILITATION AFTER A STROKE

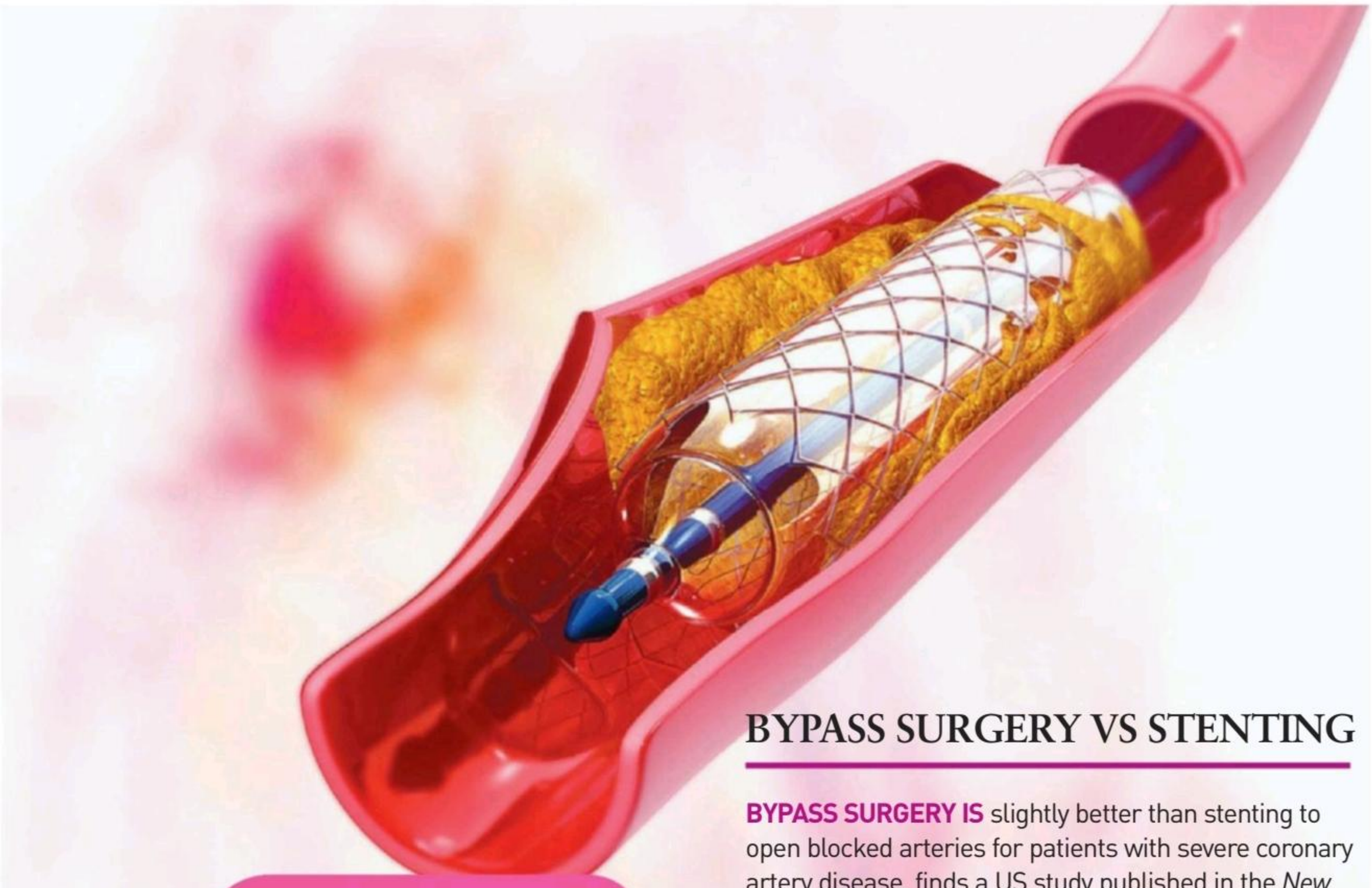
A NEW US STUDY published in the journal *PNAS* suggests that there is a critical period for rehabilitation after a stroke when recovery is the fastest.

Almost two-thirds of people who suffer a stroke do not regain complete mobility of their hands and arms which can severely limit their daily activities.

Studies in rodents have shown that there is a specific period after a stroke when networks of nerves adapt and reorganise, and the brain can learn and rewire very rapidly. Intensive motor training provided during this window can lead to nearly full recovery.

To find out if there is a similar window in humans, the researchers randomised 72 stroke patients into one of four groups. In addition to standard stroke rehabilitation therapy, participants in three groups received 20 extra hours of intensive motor skills therapy starting at 30 days after the stroke, two to three months after the stroke or six to seven months after the stroke. Participants in the control group received no extra rehabilitation therapy.

The participants' arm and hand functions were assessed at different times before and after treatment. Those who received intensive therapy two to three months after the stroke showed the greatest improvement one year after the stroke. While participants in the 30-day group showed some improvement, those in the six- to seven-month group showed no significant improvement compared to the control group.



BYPASS SURGERY VS STENTING

BYPASS SURGERY IS slightly better than stenting to open blocked arteries for patients with severe coronary artery disease, finds a US study published in the *New England Journal of Medicine*.

But patients without complex disease fared better with stents. The findings will help guide doctors decide which treatment is best for individual patients.

The study included 1,500 patients in 24 countries, average age 65, who had three blocked coronary vessels. They were randomly assigned to either receive stents (757 patients) or undergo surgery (743 patients).

After one year, the incidence of major complications such as death, heart attack, stroke and the need for a repeat procedure was 10.6 per cent in the stent group and 6.9 per cent in the bypass group.

But when the need for a repeat procedure was excluded from the analysis, the rates fell to 7.3 per cent and 5.2 per cent, respectively.

The risk of major bleeding, arrhythmia, acute kidney injury and rehospitalisation within 30 days was higher in the bypass surgery group.

The study also found that patients with less complex coronary artery disease did better with stents because they required fewer stents compared to those with complex diseases.

DID YOU KNOW?

Men with higher levels of the hormone testosterone are more likely to cheat and have more than one sexual partner at the same time.

The Journal of Sex Research

CONTRIBUTOR: SHYLA JOVITHA ABRAHAM

med talk

BY NIRMAL JOVIAL

Pollution and depression

Delhi has become a smog-house in the last couple of weeks. The air quality in the city dropped to alarming levels; schools have been shut; power plants and other industries have halted operations, and the Supreme Court called the capital city's condition a "crisis". There have been numerous studies about physical health problems—for instance, the development of respiratory and cardiovascular diseases—caused by air pollution. But its adverse impact on mental health is often overlooked. Now a new study reveals that "air pollution is changing the expression of genes that are conducive to depression".

There have been several studies in the past observing how air pollution is linked to depression. But this new study published in the journal *Proceedings of the National Academy of Sciences* is the first to show a direct neurological cause for this link.

The study observed 352 residents from Beijing—a city with high levels of pollution. As part of the study, the researchers analysed their genetic susceptibility to depression. It is observed that those with a genetic predisposition for a particular disease have an increased likelihood of developing that condition depending on certain environmental factors.

The researchers investigated the effects of having exposure to fine particulate matter (PM 2.5, which contains inhalable particles smaller than 2.5 microns), in combination with a genetic predisposition for depression, on brain networks involved in social stress.

The subjects were asked to take a cognitive test involving reason and problem-solving. The researchers found that during the test, the activity in the dorsolateral prefrontal cortex—a brain region that is involved in cognitive functions such as response selection and working memory—changed in individuals with higher PM2.5 exposure and a genetic predisposition for depression.

The researchers further wanted to examine the interaction between genetic risk for depression and air pollution. They mapped brain regions in subjects expressing high levels of depression-associated genes. Allen Brain Atlas, an online database, helped the researchers identify brain regions that are supposed to show correlated expression of genes associated with depression. The pattern derived using the Atlas and brain connectivity patterns observed during the cognitive task in those with greater exposure to air pollution and a higher genetic predisposition for depression, were found to be similar. This correlation was weaker in those exposed to lower levels of PM2.5, which suggests individuals with a genetic susceptibility to depression may be more vulnerable to the adverse effects of air pollution. The study shows that those with depression, and those with a high genetic predisposition for depression, should take extra care as the pollution level rises.

TECHNOLOGY

Breath of life

Apollo Hospitals used ECMO to save 17 lives during the second wave of the pandemic

BY LAKSHMI SUBRAMANIAN

AAYUSH GOEL

Suneeta Reddy, managing director of Apollo Hospitals

How far can a machine go to save lives? Can it save a Covid-19 patient whose lungs are severely infected? Can it act as an artificial heart when the real one is close to collapsing? For a multi-disciplinary team of doctors at Apollo Hospitals, the answer is yes. During the pandemic, they used Extracorporeal Membrane Oxygenation (ECMO) therapy to save several critically ill patients. "For patients who cannot be saved when on ventilator, ECMO is a lifesaver," said Suneeta Reddy, managing director of Apollo Hospitals.

During the pandemic, Apollo had brought together a 143-member ECMO team that had cardiothoracic surgeons, pulmonologists, perfusionists, nutritionists, technicians and nurses.

Since 2010, Apollo has used ECMO to treat 270 patients. Before the pandemic, it was used in a variety of situations, including to treat poisoning, trauma, infections such as H1N1, and to stabilise pre- and post-transplant patients.

WHAT IS ECMO?

The ECMO machine is like a heart-lung bypass system. The patient's blood is collected into the external machine through tubes placed inside large veins (close to the heart). It is then purified, oxygenated and pumped back into the body. It lessens the load on the lungs and the heart.

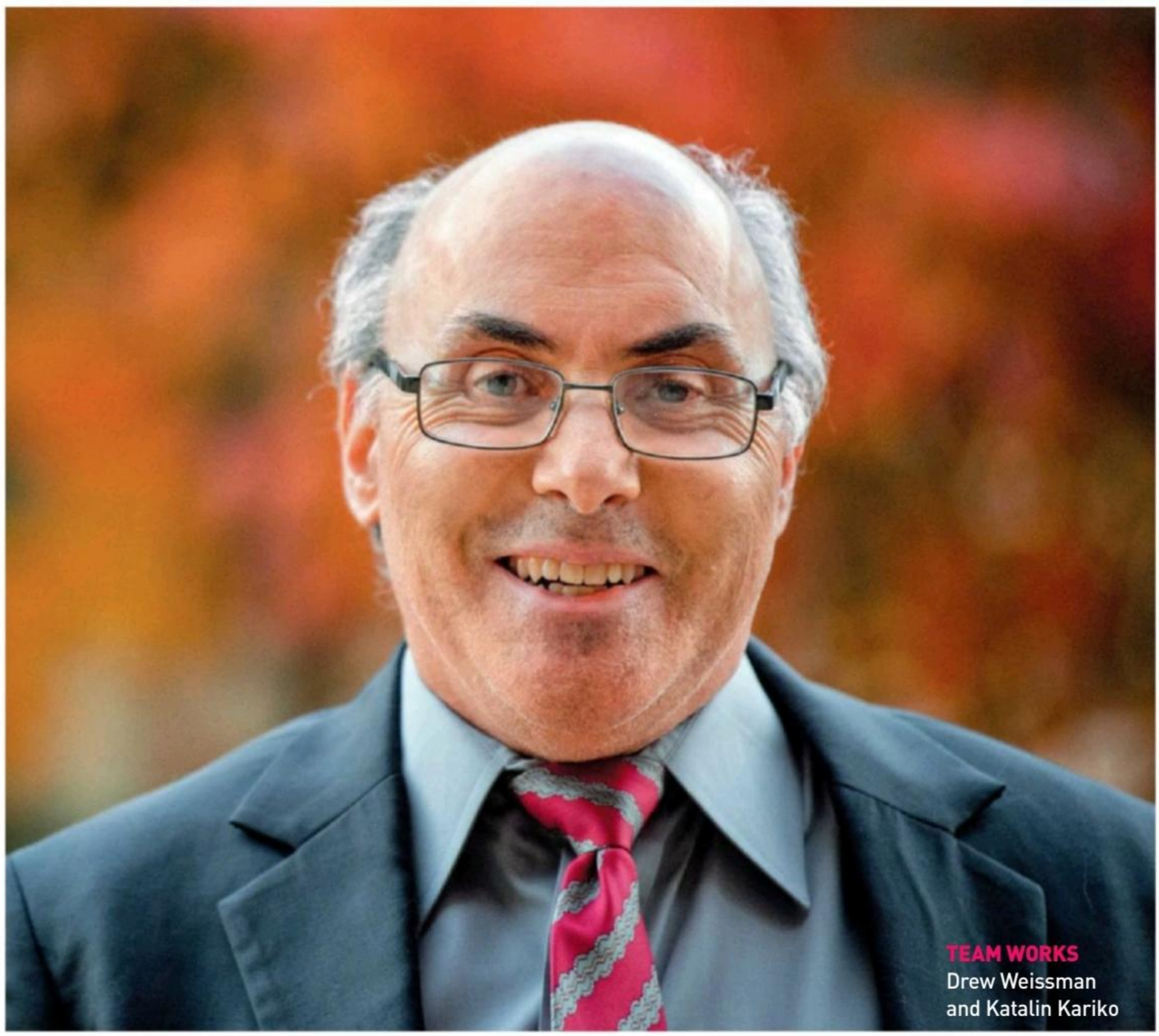
The majority of Covid-19 patients have respiratory problems and only lung support is required. In a smaller number of patients, the heart, too, needs help.

At Apollo, the multi-disciplinary team used ECMO to save 17 patients during the second wave of the pandemic. "If given enough time, the lungs can recover in a majority of Covid-19 patients," Paul Ramesh, senior consultant, cardiothoracic and heart and lung transplant surgeon, Apollo Hospitals, told THE WEEK. Of the 17, there was a 28-year-old patient from Gujarat who was on ECMO for 116 days. He recovered fully. Apollo had placed 23 patients on ECMO during the second wave; of the lot, 10 were discharged, one had a successful transplant and two are off ECMO and currently undergoing rehabilitation. Four are still on ECMO. "The average period on ECMO prior to discharge is 60 days," said Ramesh. "The current survival rate at six months for ECMO patients is 73.9 per cent [at Apollo], which is higher than the global average of 40 to 50 per cent."

Said Dr K. Madhankumar, senior consultant, cardiothoracic and heart and lung transplant surgeon, Apollo Hospitals: "The reasons for our team's success include awake ECMO, which allows patients to remain awake and engage with their families, which boosts their morale and enhances the likelihood of faster recovery and better treatment outcomes. Patients on ECMO are urged to exercise on a regular basis, and physiotherapy is provided to fully mobilise them quickly after they have been [taken off] the machine." ❶

COVID-19

THE DUO AND THE DOSE



TEAM WORKS
Drew Weissman and Katalin Kariko

GETTY IMAGES

Researchers Kariko and Weissman worked hard to chemically modify mRNA to be used safely in vaccines; now it is as safe for people with cancer

BY PRIYA MENON

The story of the mRNA vaccine is an interesting one that began three decades ago, with a little-known scientist duo who refused to quit. For more than 30 years, biochemist Katalin Karikó researched synthetic messenger RNA (ribonucleic acid), or mRNA—a genetic code. Her path was not easy.

Karikó left her native Hungary in 1985 and settled in Philadelphia. But while she landed teaching positions, her grant applications to study mRNA were repeatedly turned down. Karikó kept her focus on mRNA, exploring how the single-stranded molecules of genetic code could treat a wide range of conditions—from strokes to cancer—and also protect against influenza, among other ailments. Karikó's luck turned in 1998, when she met immunologist Drew Weissman, a professor of medicine at the University of Pennsylvania, and the two formed a research partnership.

For over a decade, Weissman, professor in vaccine research, University of Pennsylvania, and Karikó, an adjunct professor of neurosurgery at Penn and a senior vice president at BioNTech, worked to chemically modify mRNA so it could be used safely and effectively in vaccines.

Many vaccines stimulate immunity and prepare the body to fight against a specific virus by using a weakened or dead version of the actual virus. mRNA vaccines, however, carry a genetic code that causes the body's cells to produce proteins that the immune system recognises as the virus. The immune system then builds up the necessary defences against the viral proteins to protect against future infection and severe disease.

Prior to Weissman and Karikó's breakthrough research, mRNA vaccines being developed to prevent infectious diseases did not effectively and safely elicit

COVID-19

protective immune-system responses in animal models. Weissman and Karikó changed the way the mRNA was made by including specific naturally occurring mRNA modifications that make the mRNA safer, more stable, and effective for prophylactic and therapeutic purposes.

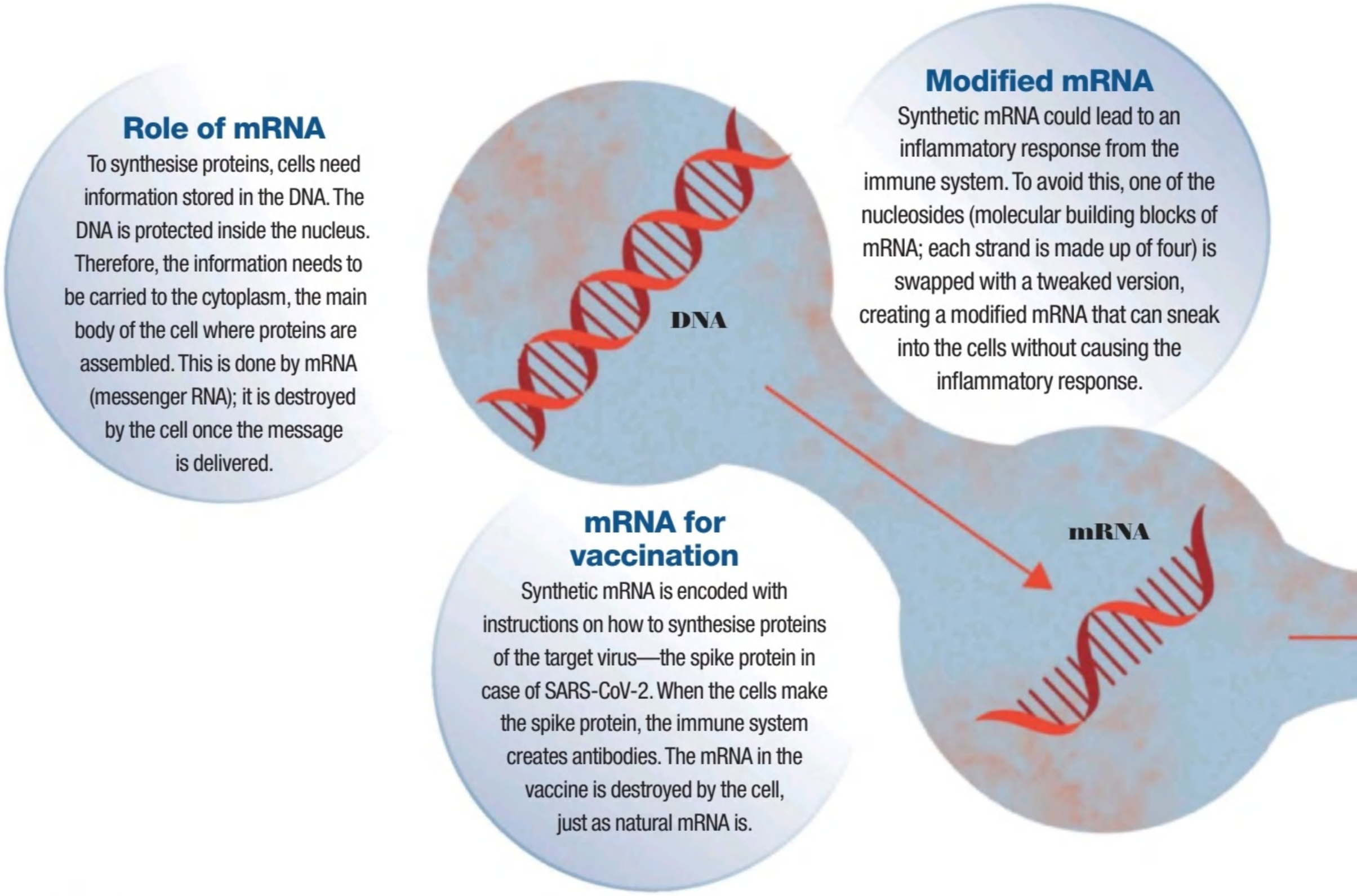
Every strand of mRNA is made up of four molecular building blocks called nucleosides. But in its altered, synthetic form, one of those building blocks, like a misaligned wheel on a car, was throwing everything off by signalling the immune system. So Karikó and Weissman simply subbed it out for a slightly tweaked version, creating a hybrid mRNA that could sneak its way into cells without alerting the body's defences.

The US Food and Drug Administration (FDA) has given the first full approval to a Covid-19 mRNA vaccine, which uses modified mRNA technology invented and developed by Weissman and Karikó, whose years of research in mRNA science laid a critical piece of the foundation for the largest global vaccination campaign in history.

The FDA's first Covid-19 vaccine approval comes at a critical point in the pandemic, as more contagious and deadly variants continue to spread. According to the World Health Organization, more than 211 million people have been diagnosed with Covid-19 worldwide, and the virus has taken the lives of more than 4.4 million people.

There are many grey areas as far as the vaccine response is considered due to lack of data, two of them being the duration of action of the vaccine's immune response and the effectiveness of the vaccine in the immunocompromised or people with cancer.

The latest data from Pfizer shows high antibody levels at six months and it could well offer the protection for a year, but whether we are looking at protection for five or ten years cannot be predicted in the wake of lack of long-term data. Moreover, vaccines elicit


Role of mRNA
To synthesise proteins, cells need information stored in the DNA. The DNA is protected inside the nucleus. Therefore, the information needs to be carried to the cytoplasm, the main body of the cell where proteins are assembled. This is done by mRNA (messenger RNA); it is destroyed by the cell once the message is delivered.
DNA
Modified mRNA
Synthetic mRNA could lead to an inflammatory response from the immune system. To avoid this, one of the nucleosides (molecular building blocks of mRNA; each strand is made up of four) is swapped with a tweaked version, creating a modified mRNA that can sneak into the cells without causing the inflammatory response.
mRNA for vaccination
Synthetic mRNA is encoded with instructions on how to synthesise proteins of the target virus—the spike protein in case of SARS-CoV-2. When the cells make the spike protein, the immune system creates antibodies. The mRNA in the vaccine is destroyed by the cell, just as natural mRNA is.
mRNA

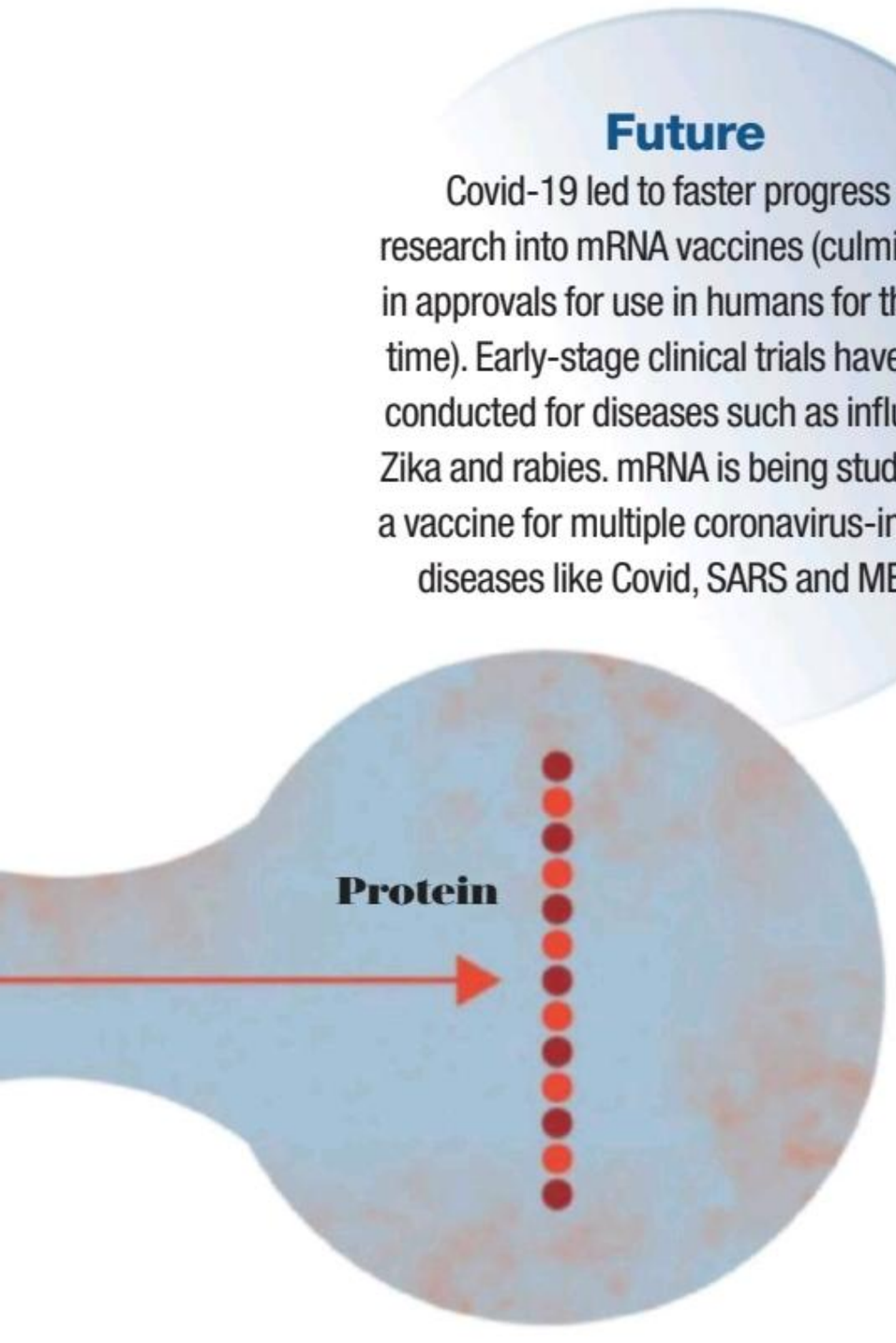
responses from memory cells and effector cells, the former of which cannot be measured by antibodies in the blood. So it's really going to take following people over time and seeing when they start getting the disease again, to decide when the vaccine needs to be boosted.

On the effectiveness of mRNA vaccines in the immunocompromised like those with cancer, Weissman opines that the more immunosuppressed a person is, the less well they're going to respond to a vaccine because when your immune system is impaired you just don't respond well to vaccines. However, any kind of response, however small it is, would help the patient and should be considered. Patients with cancer can be at high risk of severe COVID-19 due to their age, disease, cancer treatment, and medical comorbidities.

Dr Shaji Kumar, oncologist-haematologist at the Mayo Clinic, Rochester, says that to the question of should cancer patients get the vaccine, "the simple answer is yes". He goes on to clarify that, 'until we have more definitive data on the efficacy of vaccines in cancer patients, we should work on the assumption that at the minimum it will be better than not getting a vaccine, it still is going to be valuable in potential prevention of

Future

Covid-19 led to faster progress in research into mRNA vaccines (culminating in approvals for use in humans for the first time). Early-stage clinical trials have been conducted for diseases such as influenza, Zika and rabies. mRNA is being studied for a vaccine for multiple coronavirus-induced diseases like Covid, SARS and MERS.



COVID-19

Until we have more definitive data on the efficacy of vaccines in cancer patients, we should work on the assumption that at the minimum it will be better than not getting a vaccine.

—Dr Shaji Kumar,
oncologist-haematologist,
Mayo Clinic, Rochester

infection or at least decrease the severity of infections if someone gets it.'

However, evidence is in. As per study results revealed at the annual congress of the European Society for Medical Oncology earlier this year, individuals with cancer have an appropriate, protective immune response to vaccination without experiencing any more side-effects than the general population. Indirect evidence also suggests that a third "booster"shot could further increase the level of protection among this patient population. The high rates of efficacy of the vaccine observed across the trial population, regardless of the type of anticancer treatment, constitutes a strong and reassuring message for patients and their doctors.

To explore the potential impact of chemotherapy and immunotherapy on the protection afforded by vaccination against Covid-19, one of the studies enrolled 791 patients from multiple hospitals in the Netherlands in four distinct study groups comprising individuals without cancer, patients with cancer treated with immunotherapy, patients treated with chemotherapy and finally patients treated with a chemo-immunotherapy combination, to measure their responses to Moderna's two-dose mRNA vaccine.

At 28 days after administration of the second dose, adequate levels of antibodies to the virus in the blood were found in more than 80 per cent of patients receiving various cancer therapies. These results compare favourably with the antibody responses seen in almost all of the

group of individuals without cancer. The study further highlighted the importance of ensuring complete, two-dose vaccination for patients with cancer to develop enough protective antibodies against the virus, as the trial data also showed that only about one in three of those receiving treatment had achieved a sufficient response after their first shot.

Patients with cancer were excluded from the clinical trials conducted to develop the Covid-19 vaccines. The questions of whether the vaccines are safe in this vulnerable population and whether they provide adequate protection against severe forms of Covid-19 to individuals whose immune system may be weakened by various anticancer medicines had until now been left open. Research studies are offering conclusive evidence that while being largely effective, anti-Covid vaccination is just as safe for people with cancer as it is for the general population.

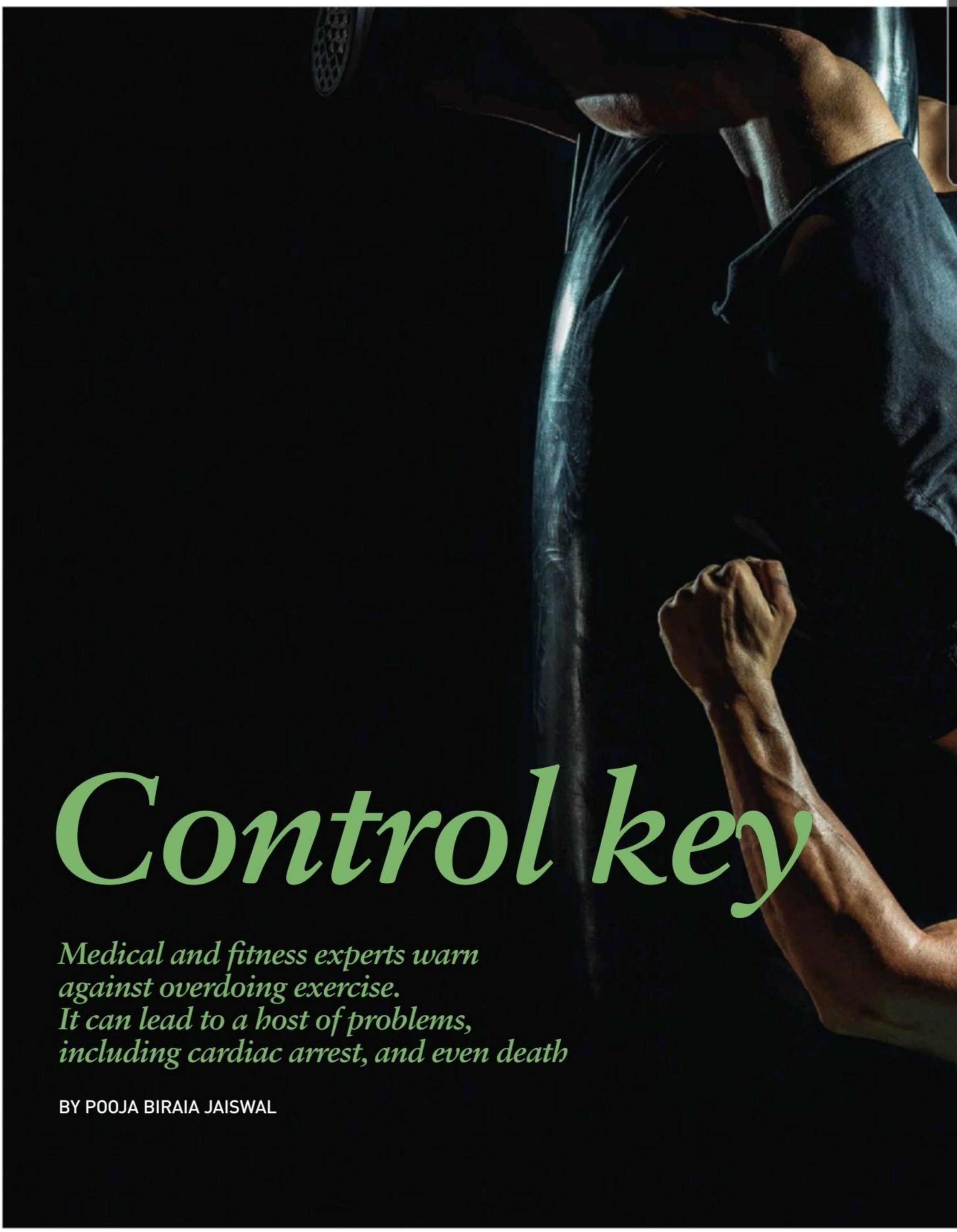
Weissman adds a word of caution, "We still don't know how good a single patient is going to respond to the vaccine. On a population basis, people with active cancer have reduced immune responses, but for each individual patient, we just don't know what that means. Ideally, we want to reach herd immunity to slow and stop this pandemic. Once that occurs people can go back to normal. My advice to my immune deficient patients is to wait for herd immunity to be achieved before going out without a mask and return to your normal life."

Of course, your oncologist is your best adviser as to the best time to take the vaccine based on the treatments you are undergoing.

Weissman and his colleagues are studying mRNA for other infectious-disease vaccines, including one for influenza and a single vaccine that may prevent various types of coronaviruses like Covid-19, SARS, and MERS—because even after the Covid-19 pandemic, other coronaviruses will still pose serious threats to public health.

Priya Menon is scientific media editor at TrialX/Applied Informatics Inc. She manages and hosts CureTalks, an international online radio talk show on cancer research and health care.

COVER STORY



Control key

Medical and fitness experts warn against overdoing exercise. It can lead to a host of problems, including cardiac arrest, and even death

BY POOJA BIRAIA JAISWAL

HEALTH

COVER STORY

In barely two months, India lost two very popular and celebrated actors—Puneeth Rajkumar from the Kannada film industry and Sidharth Shukla from the Hindi film industry and a Big Boss winner. Both were in their 40s, gym regulars and advocates of fitness. Yet, both died a sudden cardiac death; they died before they could be admitted to hospital. Neither of them suffered from pre-existing conditions. A similar death was that of Raj Kaushal, Bollywood director and husband of actor Mandira Bedi. Kaushal was 49 when he suffered a "sudden heart attack". He, too, was known for his "active lifestyle".

Each of them had complained of "chest pain" a few hours after their workout, and that has led to several questions. Did the workout have anything to do with it? Did the body undergo exertion caused by 'over-exercising', which then led to a heart attack? How can someone in the prime of one's life and a fitness buff die of heart attack, which was hitherto mostly seen in the older population and those leading sedentary lifestyles? Medical experts and scientists all agree that exercise in itself cannot be blamed for tragic clinical outcomes, and that it is mainly the "yearning for pushing the body undesirably to test its limits often as an outcome of social pressure" that is at the crux of the problem.

According to Dr Vivek Jawali, chief of cardiothoracic vascular sciences, Fortis Hospitals, one thing that could have happened in Rajkumar's case was that hardcore exercising could have ruptured his arteries. "For instance, if you have soft to moderate plaques in your arteries, then exercising very hard can lead to spiking of the heart rate, contractile force and blood pressure, which, in turn, can lead to friction of the fast-flowing blood on the arteries and rip them open," he says. He, however, adds that in Puneeth's case the heart attack did not come as a major surprise as he had a family history of heart disease. "His brother Raghavendra had come to us at 23 because of a heart attack. His father, Dr Rajkumar, was treated by us for many years for the same problem."

This June, Danish footballer Christian Eriksen suffered a cardiac arrest and collapsed on field during Denmark's opening Euro 2020 match. The footballer got a miniature defibrillator fitted to detect and correct heart rhythm disorders.

A cardiac arrest, say experts, occurs when the heart stops completely, rendering the person unconscious. A heart attack, on the other hand, is a condition that slows down blood circulation, and the patient may stay conscious.

"We have always had young patients coming to us due to heart attacks caused during and after physical exercises, and a lot of them have been extremely fit also," says Dr Sudhir Pillai, consultant cardiologist, Hinduja Hospital. He explains that phys-

According to Dr Vivek Jawali of Fortis Hospitals, one thing that could have happened in Kannada actor Puneeth Rajkumar's case was that hardcore exercising could have ruptured his arteries.

Our biological fitness

BY DR RAJESHWARI JANAKIRAMAN

Biological fitness goes far beyond just body weight. For instance, when someone is overweight, losing just 5 to 7 per cent of body weight can bring several benefits—metabolism moves into the normal range, blood sugar level comes down, there is reduced dependence on medicines, cholesterol drops, blood pressure is normalised and thyroid fluctuation is in control. So if we have a 100-kilo man whose ideal weight is 60 kilos, losing just 10 per cent of his weight might not make much difference to his appearance or physical fitness, but, biologically and metabolically, there will be tremendous benefit. One need not go to the same extremes to achieve biological fitness as one does to get a certain physique.

Biological metabolism has to do with ensuring that the respiratory and cardiac parameters are in place, and breathing is normal. For instance, normal blood pressure is 125 and pulse is about 72. Maintaining a non-extreme exercise regime and a balanced diet goes a long way in establishing biological fitness. There is no shortcut. You cannot achieve it by drastic and sudden changes to your daily routine.

The parameters for gauging biological fitness are fairly simple: an adult must be able to walk at a speed of 5 to 7kmph. If you can do that, you do not have to go overboard with exercise. Biological or metabolic fitness means being able to do everyday activities without any stress. There is no need for excess muscle building using weights or high-protein diets.

A person might have abdominal obesity, but it might not hamper his day-to-day living. Having said that, it could also be damaging his biological fitness and he might not even know until it is too late. Ideally, adults must get around five hours a week of moderate exercise or two-and-a-half hours of more intense activity or a combination of the two. Going over that will not drastically increase one's health benefits. To give the most basic example, I would say that light to moderate runners have a lower risk of death (from fitness-related issues) than people who are sedentary, but those who run at an extreme pace many times a week have an increased risk compared with those who do not run at all. This is because an extreme endurance workout puts demands on the body's cardiovascular system. Too much intensity can undo some of the benefits gained from being active. After a round of workout, assess how you feel physically and emotionally, and you will know if you have been pushing it too hard.

The writer is consultant endocrinologist, Manipal Hospitals, Bengaluru

COVER STORY

KNOW YOUR LIMITS

Your exercise intensity should be within your fitness level; make sure you are not pushing too hard

PHYSICAL ACTIVITY RECOMMENDED FOR HEALTHY ADULTS

AEROBIC ACTIVITY

Moderate intensity

Brisk walking, swimming, mowing the lawn, etc.

At least **150 MINUTES** a week

Vigorous aerobic activity

Running, aerobic dancing, etc.

At least **75 MINUTES** a week

STRENGTH TRAINING

Free weights, weight machines, activities like rock climbing that use your own body weight, squats, planks, lunges, etc.

At least **TWICE A WEEK** for all major muscle groups

TALK TEST

To find workout intensity, try talking just after an exercise:

If you are breathing hard but can still have a conversation—**MODERATE-INTENSITY ACTIVITY**

If cannot say more than a few words without pausing for breath—**VIGOROUS-INTENSITY ACTIVITY**

GRAPHICS **SYAM KRISHNAN**/ RESEARCH **NIRMAL JOVIAL**

The Centers for Disease Control and Prevention recommends that adults get at least 150 minutes of moderate exercise per week to help ward off unhealthy weight gain and heart disease.

ARE YOU OVEREXERTING?

Signs to look out for:

- Decreased agility, strength and endurance
- Abnormally elevated heart rate during exercise or through the day
- Heart rate takes longer to return to normal after a workout
- Excessive fatigue
- Sore muscles and heavy limbs
- Mood swings, unusual irritability, lack of concentration
- Insomnia or restless sleep
- Loss of appetite
- Constant aches or joint pain; pain that does not subside in a couple of weeks is a major injury
- Frequent illnesses and upper-respiratory tract infections
- Metabolic imbalances like iron deficiency
- Anxiety, depression, losing motivation

SOURCE: MAYOCLINIC.ORG, ACEFITNESS.ORG

ical fitness may not always be the same as "biological fitness". The body, he says, does not care about physical fitness, it is about how healthy you are metabolically. He cites three important reasons for young patients to get sudden cardiac arrest—one, owing to a heart attack when the arteries shut down; two, because of arrhythmia when the heart becomes very fast due to underlying heart disorder; three, arterial dissection, where because of the sheer physical or emotional stress, including sudden heavy exercises, the walls of the artery pop.

The moment we cross the age of 20-25 years, says Pillai, we all have these small cholesterol deposits or plaques in our arteries, which may build up over time. Plaque rupture can happen because of extreme physical stress that one is otherwise not conditioned to, or owing to extreme emotional stress and biological stress such as acute infections.

"It takes long years for fitness to be established," says Pillai. "It is one that begins in childhood and goes on into adulthood. It is worth noting that these kinds of sudden cardiac deaths are not observed much in rural areas or in the labour class or farmers or tribals who have all been doing physical work for years." For people who take up physical exercise in their 30s and 40s, Pillai's advice is to give the body time to adapt. "One cannot suddenly start running marathons in short timelines by giving in to peer pressure," he says. "That can lead to the plaque rupturing and sudden cardiac arrest. Also, those who may be into exercises and fitness for long, but decide to stretch their limits further, for instance, suddenly moving from 20km daily to 40km on a single day will sense trouble at some point. Sheer exhaustion can create either a plaque rupture or dissection of the artery. So please take it slow."

Mahesh Ambekar, a fitness trainer who runs a gym in Mumbai, narrates the tragic death of a 40-year-old owing to sudden cardiac arrest while working out in his gym. "He was a regular and was on top of his game," he recalls. "On that particular day, he overdid it with weights and cardio. In his thrill for testing the limits of his body, he took up deadlifts that were close to 100kg, something he had never attempted before. I think that did it. It was just all of a sud-

den and we had no time to act."

'Ego-lifting', says Ambekar, is the cause of most injuries and even death inside the gym. "One of my clients was doing leg press, which helps in building the quadriceps and hamstrings of the thigh and buttocks," he says. "He was a gym regular and knew his regimen well. Yet, he went overboard with the weights. While he ideally had to take 180-200kg, he took 350-400kg weights simply as a way of massaging his own ego and ended up with a broken shin-bone, which carries the majority of the body's weight."

Experts agree that extreme exercise can be toxic to the heart. As per a 2018 research report titled, 'Characteristics and prognosis of exercise-related sudden cardiac arrest', published in *Frontiers in Cardiovascular Medicine*, while physical activity is an established protective factor for coronary heart disease, stroke and heart failure, and may also reduce the risk of sudden cardiac death in the general population, "those who suffer sudden cardiac arrest in association with physical activity tend to be younger and previously healthier". As per the report, cycling and heavy physical labour were the most common types of physical activity related to sudden cardiac arrest. Reports have also emerged that say putting in excessive running miles, such as ultra marathons, may lead to conditions that may promote cardiac rhythm disturbances.

Over-exercising effects go beyond the heart. Dr R.H. Chauhan, orthopaedic surgeon at Bhatia Hospital in Mumbai, says that he regularly gets patients with knee pains, backaches and muscle tears, either because they go overboard on the treadmill or lift excess weight or indulge in too much strength training in the gym too soon.

One cannot suddenly start running marathons in short timelines by giving in to peer pressure. That can lead to the plaque rupturing and sudden cardiac arrest.

Dr Sudhir Pillai, consultant cardiologist, Hinduja Hospital

Gym trainer and fitness enthusiast Snehal Thevan, who has been training at a gym in Mumbai's Kurla for over seven years now, cites the example of a "fitness freak who overdid it with squats" The man, in his early 40s, did squats with dumbbells weighing over 90kg. "He should have stuck to 40-50kg," she says. "But because he went overboard, he got a slip disc when he tried getting back up."

Over-exercising or going overboard with workouts can mean different things to different people, says Chauhan. For somebody who has never exercised in his or her life, overdoing it can mean suddenly indulging in excess workout just for the kick of it. "The legs and the hands stop growing between the ages of 14 and 16 years and the spine stops growing at the age of 22," says Chauhan. "So that is why any kind of weight-lifting exercise before the age of 18 is not recommended because

it can affect one's growth. The most decisive indicator of overdoing it in a gym is the repetition level of a workout. How many times do you do the same exercise over and over again? And, is it too much too early? If the answer to that is a yes, then you are sure to experience muscle fatigue, muscle spasm and muscle tear, and laxity, looseness and injury to the ligaments."

Chauhan recounts the case of a man who started working out in his early 30s. "He began with 40 reps of every exercise in the gym, right from strength training to weights to squats, instead of taking it slow with 10 reps at the start," he says. "That alone became the reason for soreness in his muscles and it had a major impact on his knees."

Also, while lifting very heavy weights, one can injure the body. "You can sprain any joint during weightlifting, starting from the ankle, lower spine, middle spine, upper spine and elbows," says Chauhan. "A spinal vertebral fracture, resulting from excess weightlifting, is a high possibility, too." He cites the example of his friend, also an orthopaedic surgeon, who recently fractured his spine and was bedridden for three days because of overdoing the bent-over-rows exercise.

Another example of overdoing it among teenagers is going on a 12km hike with friends all of a sudden with no previous workout routine. Treadmill-related knee injuries that cause wear and tear of joints are the most common gym injuries, and long-term treadmill use in the wrong fashion can even increase the risk of arthritis, says Chauhan. Most of his patients are in the age group of 20 to 40 years who cannot wait to lose weight and build up their muscles and stamina. They want to see the results in a matter of days and that is exactly when things begin to go wrong, he says.

So, just how much exercise is too much exercise? We cannot tell for sure, just yet. "There is no pre-defined limit because the science around over-exercising is simply not enough," says Dr Aashish Contractor, director of rehabilitation and sports medicine at the Reliance Foundation Hospital, Mumbai. "We have not conclusively proven that too much exercise is bad and what the cutoff point is."

Aanchal Gupta, who runs the Arts in Motion studio in Mumbai that focuses on free-style exercises, says that exercise, even if strenuous, will offer more benefits than risks and only a small minority of those who may be having underlying problems might experience arrhythmia.

Agrees Pillai: "There is no doubt that pushing one's body to its maximum every day can stress the heart and raise the risk for arterial fibrillation, a

WORK IT OUT
Aanchal Gupta, who runs the Arts in Motion studio in Mumbai, says that exercise, even if strenuous, will offer more benefits than risk

COVER STORY

Training your mind

BY GRAND MASTER AKSHAR

If we are able to maintain a state of mental wellbeing that is beneficial for us, then we can easily progress towards growth, prosperity and harmony.

Staying healthy is a very important part of living. We may be able to forego a lot of other things, but health is something we need if we want to truly enjoy life. And when it comes to the topic of over-exercising, then you must be able to work your fitness routine also into a system. We all have different capacities in terms of stamina, strength, flexibility, and we should learn to slowly build our capacity.

Rest and recover

Looking at this from the perspective of yoga, there is an important point to keep in mind. Yoga covers all aspects of health, which includes the physical, mental as well as spiritual health. Therefore, while exercising it is important that you invest as much in your spiritual and mental health as you do in your physical fitness. Death is inevitable and no matter what you do you cannot escape it. Rest and recovery are an important process in fitness. Not only does your body need time to heal and recover, but you must also pay close attention to your mental wellbeing. Find enough time for relaxation and also indulge in activities that are good for the mind, body and spirit—whether it is reading a book or finding a hobby that helps you increase your creativity. These are all different ways to de-stress the mind, which then helps you to become a healthy individual.

Do not suppress emotions

If you carry stress, anxiety and any other form of repressed or suppressed emotions, this could harm you in the long run. This is because it spills over in any activity that you do. By finding enough time for relaxing, you are ensuring that the body and the mind are able to recharge and rejuvenate in order to continue with anything that you are pushing yourself to do.

Self-awareness

Most important, you must be aware of your own mental wellbeing and health. When you are happy and calm, this also translates into the physical body. If you perform any

activity while holding a lot of stress within you, then it invariably affects your productivity and creativity. Most of us lead with the mind and the mind can be a tricky companion. The mind can lead us either towards goodness or towards harm. If we are able to maintain a state of mental wellbeing that is beneficial for us, then we can easily progress towards growth, prosperity and harmony. But if we are full of fear, worry or negative emotion, then all our actions will be led by these emotions, causing us harm and self destruction.

Find what works for you

Everybody deals with different kinds of situations in life, and there are no two people with the exact same problems. Therefore, the solutions also have to be different. Keeping this in mind, it is essential that you analyse how you deal with troubling situations or challenges that life throws at you. If you are a person that tends to hold everything inside you and are unable to express how you truly feel, then in the long run this builds up, causing a lot of physical problems, like lifestyle diseases. Thus, you must make a conscious effort to seek out people or activities that help you to open up and express yourself freely. Last but not the least, practise yoga and also consume a nutritious diet. Find a reasonable balance in your life with work and play. Rest as well as you push yourself hard.

Treadmill-related knee injuries that cause wear and tear of joints are the most common gym injuries, says Dr R.H. Chauhan, orthopaedic surgeon at Bhatia Hospital in Mumbai.

type of abnormal heart rhythm that can lead to heart failure or stroke. But it is important to know that not exercising at all is far worse for the heart than overdoing it, because not getting the blood pumping can lead to clogged arteries and so moderation is key." The Centers for Disease Control and Prevention recommends that adults get at least 150 minutes of moderate exercise per week to help ward off unhealthy weight gain and heart disease.

Jawali notes that heart attack cases among Indians below 50 years doubled in the last 20 years, and such cases increased by 25 per cent among those under 40. A similar trend is noticed among urban women, too. "The problem is a mixed bag of genetic predisposition toward heart attack, which is almost three times more among southeast Asians than among whites and blacks," says Jawali. "This has been compounded by a dramatic change in lifestyle."

While in the US, a number of athletes and fitness enthusiasts die of sudden cardiac deaths resulting from heart attacks because of irregularity of heart rate, young Indians are dying because of accumulated plaque in their arteries and not irregular heart rhythms, explain doctors. These small plaque lesions collected over time due to sedentary lifestyles will become blocked by the time one is 60, say doctors.

"It is not the exercise that is getting people into trouble," says Pillai, "it is the manner in which the body is put to test during exercise which is the problem. One has to understand the limits of one's own body and follow a structured form of exercise and watch for signs of over-exercise. The most common way of finding it is [to check if your] heart rate is high and [if you] are not able to eat well [in the morning]. Take a break. For instance, after six weeks of good running, take one week off."

Another problem that Thevan has observed is fitness enthusiasts overdoing one particular workout. For instance, somebody who enjoys treadmill spends more than an hour on it while neglecting the other elements of the body. "This type of overtraining presents itself as knee pain, soreness in the legs and also a sort of exhaustion," she says. The solution lies in diversifying one's workout routine, she adds. ◆

COVER STORY

Moderate exercise is the way to go

Evaluate cardiac risk factors, heed warning signs and prepare adequately before training harder

BY DR AASHISH CONTRACTOR

Over the past few months, there have been a number of sudden cardiac deaths in relatively young, and seemingly healthy individuals. This has caused great consternation, especially among those who exercise. The fear has been exacerbated, since many of these celebrities were regular exercisers. And that has raised the question of 'excessive exercise' and its potential harm, instead of benefit. As is the wont these days, social media has been on fire with advice from various sources, which have increased rather than allay the fears.

Exercise and the heart

Studies done over several decades have clearly shown the benefit of regular exercise and physical activity to reduce the risk of heart disease. Exercise can benefit the heart, directly and indirectly. Direct benefits include helping the heart muscles get stronger and pump more blood per heart beat as well as the ability to withstand abnormal heart rhythms better. Indirect benefits include control on blood pressure, sugar, cholesterol and body fat, all of which reduce the chances of a heart attack.

Exercise and sudden cardiac death

There is nothing more dramatic and scary than an athlete having a cardiac arrest during play, or immediately after exercise. It also generates more fear than the larger number of people who have the same event while, say, watching TV, working or even during sleep. Research has suggested that the commonest causes of these deaths differ in those who are young (below 35 years) versus those who are older. At this point, it is also important to distinguish between a heart attack and a cardiac arrest. A heart attack, or myocardial infarction, occurs when a blockage in the coronary artery ruptures and blood flow to the heart muscle is cut off. Usually, one third of heart attacks lead to cardiac arrest and death. As the name suggests, a cardiac arrest occurs when the heart stops beating. This can happen because of several causes, with heart attack being one of them. In the younger age group, a condition known as cardiomyopathy is the commonest cause of cardiac arrest and death, while in the older group, a heart attack is the commonest cause of death.

Can you exercise too much?

On social media, it is common to attribute some of the deaths in young and fit persons to excessive exercise. It is important to keep in mind that sudden cardiac death very rarely occurs in someone with a healthy heart. Exercise may be the trigger to have a cardiac event in individuals who have undetected or silent heart disease, but it is almost never the cause. In terms of a single episode of exercise, there is no absolute upper limit defined, and it all depends on the individual's training level. One should avoid high levels of unaccustomed exertion, the rule of thumb being that any given bout of exercise should not be more than a ten per cent increase from previous bouts. Environmental conditions should also be considered, and outdoor exercise should be avoided in extreme weather conditions, as this is one scenario where even

a healthy person can suffer serious consequences.
Another way to look at 'too much exercise' is the overall volume of exercise accumulated over the years. Here, the research has shown that a very large volume of exercise over several decades might cause some changes in the heart muscle, as well as accumulation of calcium in the coronary arteries. At this point, the amount of exercise has not been defined, and the consequences of these changes have not been fully understood. However, it is well known that to reap optimum health benefits, moderate exercise is the way to go.

How does one reduce the risk?
1. Pre-participation health check
2. Paying heed to warning signs
3. Sensible and appropriate training programmes

Pre-participation health check
There is no definite testing protocol that can completely rule out risk, but we can certainly minimise it. The first step is to evaluate your cardiac risk factors, which include age, family history, smoking, high cholesterol, hypertension, diabetes and obesity. In my experience, if there is a cardiac death in a close family member, below the age of 60 years, we need to be more watchful. Review your cardiac risk factors with your physician, who will decide on the need for further testing. For most people, there should not be any need for further testing before starting with a moderate exercise programme, such as brisk walking.

Warning Signs
Several studies have shown that individuals who experienced cardiac events during exercise often had mild warning signs and symptoms prior to the event, which they ignored. The most important of these are:
1. Chest discomfort, which may present as acidity or heartburn
2. Increasing fatigue
3. Unusual breathlessness with usual levels of exercise

Appropriate training programmes
All exercise programmes should progress gradually. Most arrests and deaths occur in individuals who participate without adequate preparation or those who ramp up their training exponentially. At the end of vigorous physical exertion, it is important to cool down appropriately, since reduced blood supply to the heart may be exacerbated by abrupt cessation of activity.

Take-home message
Regular exercise has great health benefits. It is important to start at a low level and progress gradually to a moderate level. If you would like to engage in vigorous exercise, it would be prudent to review your risk factor profile with your doctor, before doing so. During exercise, if you feel any discomfort or unusual symptoms, stop and get yourself evaluated.

The writer is director of rehabilitation and sports medicine at the Reliance Foundation hospital, Mumbai.

COVER STORY

Quit playin' games with my heart

Christian Eriksen's cardiac arrest puts the spotlight on the consequences of overworking athletes

BY REUBEN JOE JOSEPH

Denmark vs Finland. The Euro 2020 match this June between the Nordic countries was supposed to be one of the low-key fixtures of the group stages, and yet it turned out to be the most talked about.

The world watched in horror as Danish star midfielder Christian Eriksen collapsed face first in the 43rd minute of the game and players of both teams rushed to revive him. He had suffered a cardiac arrest.

German doctor Jens Kleinfeld was by his side within seconds, performing cardiopulmonary resuscitation (CPR). An electric shock from a defibrillator worked and Eriksen opened his eyes after 30 seconds.

"Are you back with us?" Kleinfeld asked Eriksen.

"Yes, I am back," Eriksen responded feebly. "Damn, I'm only 29 years old!"

The player's words echoed what was on everybody's mind: how could a fit athlete at the top of his game suffer a cardiac arrest mid-match?

As Eriksen was transferred to a hospital and news trickled in of his health improving, possible reasons for the sudden attack were being spelled out by physicians.

Eriksen was playing in his 66th competitive fixture in exactly one year since football restarted after a break because of the pandemic.

Just a few hours before Denmark's first Euro 2020 game, FIFPRO—a global union of professional footballers—had reiterated its long-standing view that players were under increasing pressure because of a congested schedule.

The Dane's former cardiologist, Dr Sanjay Sharma of St George's University, London, had told The Mail that Eriksen had no prior history of heart issues. He had been screened regularly since 2013 at football club Tottenham Hotspur and the tests always returned normal.

The doctor's inference was that FIFPRO is right. The relentless schedule can take its toll on athletes, though it may not seem like it. The fatigue of extended periods in a bio-bubble with little rest between tournaments was also cited as one of the reasons for the Indian cricket team's dismal show at the T20 World Cup, as players

like Virat Kohli voiced the need to "manage his workload".

Six days after the unexpected attack, Eriksen walked out of the hospital. He is fitted with an implantable cardioverter-defibrillator in his chest, a device that addresses irregular heart rhythms. He has been undergoing rehabilitation in Denmark.

Though he has been given the green light to resume light physical activity, his doctors have told him that it would take at least a year of monitoring him to decide if he can resume high-intensity training and competitive football.

For now, the Italian league, where Eriksen plays domestic football, does not allow players to participate with devices like the ICD fitted to them. His club, Inter Milan, has since prohibited him from returning to action for the remainder of the ongoing season, which ends in May 2022.

Doctors have told Eriksen that follow-up tests would tell whether the ICD would be a permanent fixture for him or whether it can be removed by next year. It is uncommon for footballers to play with ICDs, but not unheard of. Dutch defender Daley Blind was fitted with an ICD in 2019 after being diagnosed with heart muscle inflammation, but he has continued playing for both club (Ajax) and country.

Eriksen might be back on the pitch next year, perhaps in a different domestic league where ICDs are allowed. But the concerns remain of overworking professional athletes as more competitions are squeezed into their calendar every other day.

MINDSPACE

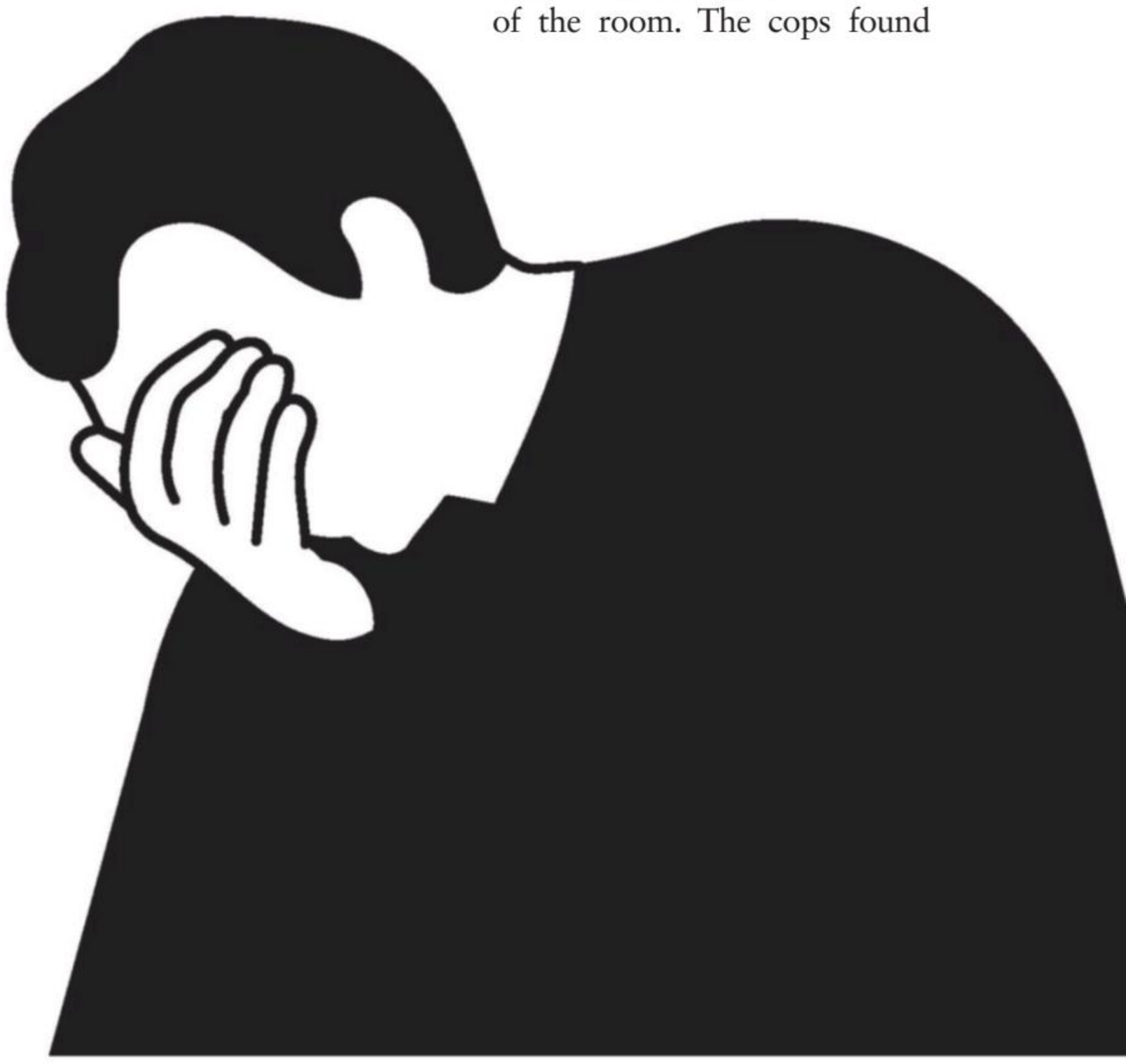
Dangerously delusional

How to diagnose folie a deux, a growing concern in our society

BY DR ALOK V. KULKARNI

Recent media reports have focused on the peculiar case of Purushottam Naidu and his spouse Padmaja, who murdered their daughters. This gory incident took place in Chittoor district of Andhra Pradesh. When police rushed to the scene, they found the bodies of the couple's daughters, Alekhya, 27, and Sai Divya, 22. They were allegedly bludgeoned to death using dumbbells. The Naidus thought that 'evil spirits' had infested their younger daughter's head, which is why they had to break open her skull to rid her of the 'evil forces'. The couple was distressed that their 'ritual' was broken by the police while they tried to resurrect their dead daughters. The wife even instructed the police to come back the next day to witness a miracle, wherein the dead daughters would be brought back to life. Police found the couple to be in a state of complete denial, trance and disorientation, amid a pool of blood. The Naidus told the police, that they received signals from heaven and had a house of miracles.

Netflix is now streaming a three-part documentary series titled *House of Secrets: The Burari Deaths*. Apart from India, the series is also trending in Pakistan and most countries in south Asia. It details the suicide pact of ten members of a Delhi family. They were found hanging from the ceiling, blindfolded, gagged, and with their hands tied behind their back. The eleventh member—the oldest woman in the house—lay strangled in a corner of the room. The cops found



diaries in the house written over 11 years. It had detailed instructions on how every single member of the family was supposed to go through life, where they are to invest money, and explicit instructions for 'mass salvation', including how the hangings should be conducted. The primary source of all these oddities is finally pointed to a relatively young family member with a history of unaddressed trauma.

In November 2019, Ellen Barry, a journalist with *The New York Times*, wrote a highly cited article titled 'The Jungle Prince of Delhi'. In it, Barry chronicled the 'royal family of Oudh' that had been deposed, and had resigned to their fate of living in a ruined palace in Delhi.

The cases reflect an uncommon but intriguing psychiatric disorder, known by many names. Some of these names include double insanity, psychosis of association, shared psychotic disorder, and induced psychosis.

Folie a deux ('madness for two') is the French terminology for this disorder, which is characterised by the presence of similar psychotic symptoms (usually delusions) in two individuals. A delusion is defined as a fixed, false, unshakeable belief that is out of keeping with a person's social and cultural background. The person who first develops the delusional symptoms is referred to as the 'primary' patient. He/she can be distinguished from one or more 'secondary' patients. In these secondary patients, the delusional symptoms are induced by the primary patient. This phenomenon of

MINDSPACE

Folie a deux ('madness for two') is the French terminology for this disorder, which is characterised by the presence of similar psychotic symptoms (usually delusions) in two individuals.

transmitting symptoms is not seen in any other psychiatric disorder, and this lends intrigue to this complex phenomenon.

The term folie a deux was coined in the 19th century by two French psychiatrists—Charles Lasegue and Jean-Pierre Falret. It is posited that transmission of psychiatric symptoms from one individual to another occurs under a special set of circumstances. A more active and intelligent person generates delusional themes and ideas, while a submissive person can act as a passive recipient of these ideas. It is in this context that assimilation of these delusional ideas occurs.

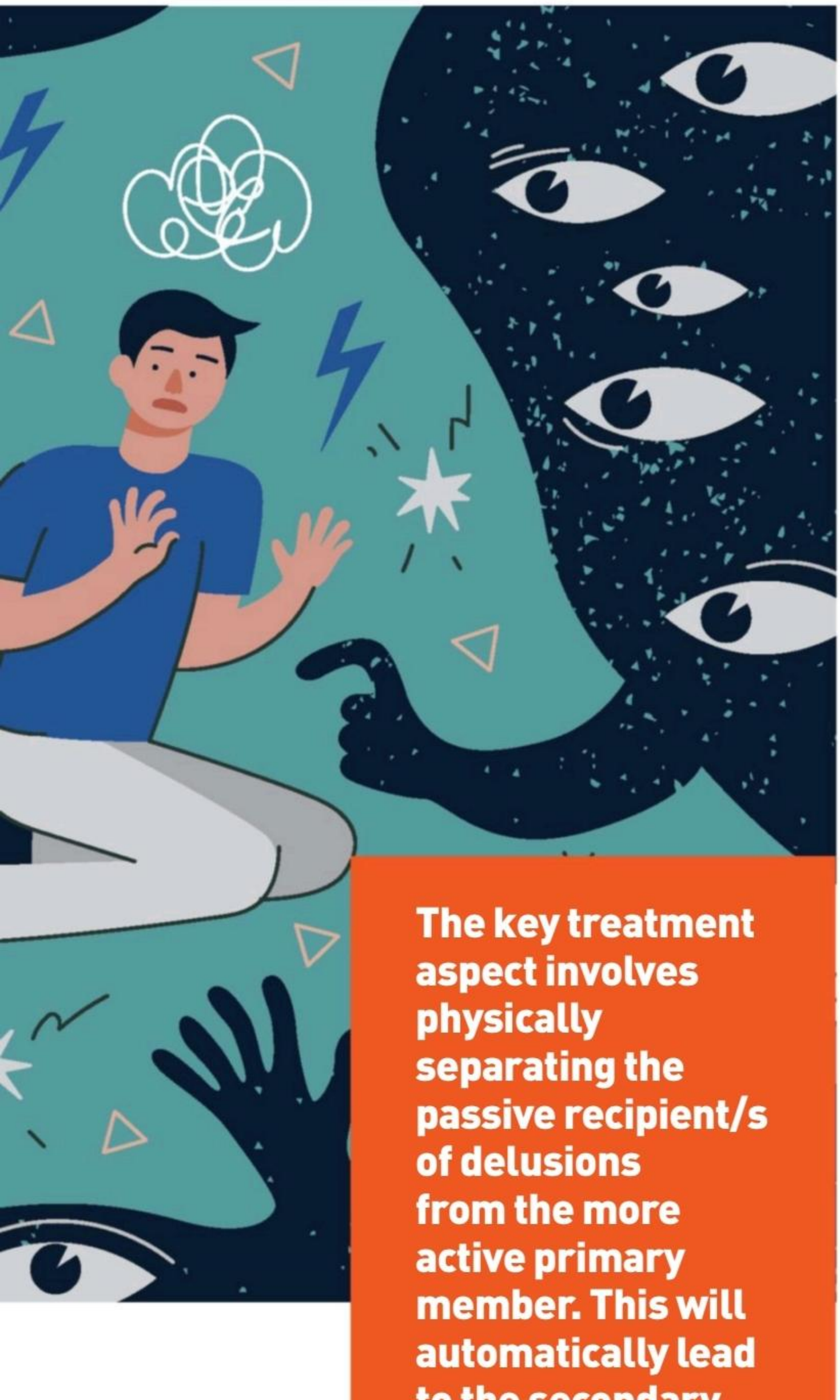
Covid-19 and the consequent global lockdown have served as a ground for social isolation and depravity. Under such unprecedented circumstances, having close physical and social ties becomes next to impossible. This facilitates the easy transmission of delusional ideas, in persons having close associations via common interests, opinions, values and emotions.

As with any other psychiatric disorder, genetic and environmental factors play a pivotal role in the genesis of this disorder. It is more common in families who have had members suffering from any other psychiatric disorder, particularly schizophrenia. The family climate serves as the environmental trigger in the pathogenesis of this disorder. The key factor in precipitating induced delusional disorder is disturbed interpersonal relationships.

An interesting offshoot of folie a deux is folie a famille. It is characterised by the presence of delusional ideas in more than two members of the same family. In most cases, individuals across several generations are affected such as grandparents, parents and children. Typically, these families shun treatment as they have little to no insight into their delusional belief systems. Folie a famille is a common occurrence in the context of socially isolated families, in closely enmeshed families wherein there is a high and abnormal degree of interdependence, in unstable families who have frequent crises, and in families having highly dominant personalities who serve to transmit these delusions.

The diagnosis is made on clinical grounds, and includes detailed assessments of all the affected family members. In some contexts, brain scans (MRI, CT) are ordered especially if the symptoms are secondary to organic brain conditions such as brain tumours, metastasis to the brain secondary to cancer, head injury and dementia. A panel of blood investigations to rule out thyroid abnormalities, vitamin B12 and vitamin D deficiencies are also commonly ordered.

A multi-component treatment approach is essential as for any other psychiatric disorder. The key treatment aspect involves physically separating the passive



The key treatment aspect involves physically separating the passive recipient/s of delusions from the more active primary member. This will automatically lead to the secondary family members ridding themselves of their delusional belief systems.

recipient/s of delusions from the more active primary member. This will automatically lead to the secondary family members ridding themselves of their delusional belief systems, as they are no longer controlled by a more dominant person. Treatment approaches include a specialised form of talk therapy called cognitive behavioural therapy (CBT), which encompasses two processes---the cognitive component and the behavioural aspect. The cognitive component will explore the way the affected family members think about themselves, the world, and other people including other family members. The behavioural component of CBT will examine how their actions further influence their thought processes and feelings. CBT adopts a 'here and now' approach to problem solving. CBT may involve anywhere from five to 20 sessions, and each talking session lasts between 30 to 60 minutes. Inputs are also given in the form of family therapy. This involves all the family members and tries to address the interpersonal conflicts that may be present within families. In some persons wherein the symptoms continue even after physical separation, low dose medications that block chemical messengers in the brain are given for a short period. The technical term for this class of medications is dopamine receptor blockers (DRBs), and these are commonly referred to as antipsychotics. Careful consideration is given to personalising the right medication for each individual.

The prognosis for affected family members is good, and most members make a full functional recovery with the right support.

YOGA MADE EASY

By Dr S.N. Omkar
yogaomkar@yahoo.com

QUITE A HIP MOVE!

One of the high load-bearing and functionally-active areas is the complex consisting the lower back, the hip and the pelvis. The health of this region is important for an active lifestyle. Here is a simple movement to help the lumbo-pelvic-hip complex.

METHOD:

- ☞ Lie with your face downward on a mat
- ☞ Stretch the toes back and tighten the buttocks and calf muscles
- ☞ Stretch both hands forward
- ☞ Rest the forehead on the mat
- ☞ Flex the elbows, place the palms by the side of the forehead
- ☞ Flex the right leg on the floor—thigh perpendicular to left leg and leg parallel to left leg
- ☞ Press the palms and slowly raise the trunk and neck
- ☞ Straighten the arms, open the shoulders
- ☞ Lift the neck and bend back
- ☞ Tighten the buttocks
- ☞ As you inhale, abdomen should expand
- ☞ As you exhale, abdomen should contract
- ☞ Stay for about 20 seconds
- ☞ Slowly come down and change side
- ☞ Repeat and relax

MODEL: YUKTHA RAJGOPAL

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